

1                   **COMBINED HORIZONTAL AND VERTICAL CPR DEVICE**

2

3    Field of the Invention

4           This invention relates to the field of cardio-pulmonary  
5    resuscitation (CPR) and a device for assisting in the performance  
6    of the procedure.

7

8    Background of the Invention

9           CPR has been taught to numerous emergency medical personnel  
10   (EMP) and others as a procedure for external heart massage and  
11   forced ventilation for use with heart attack victims. This  
12   conventional technique provides partial blood pressure,  
13   simulating a heart beat, and oxygen rich forced inhalation to the  
14   lungs. In a situation where no medical equipment is present, the  
15   procedure requires the EMP to place his hands on the sternum of a  
16   supine victim and compress the chest cavity of the victims by a  
17   quick downward stroke. This stroke is repeated to approximate  
18   the frequency of a regular heart beat. After several strokes,  
19   the victim's airway is cleared and a volume of air is forced into  
20   the lungs by blowing air from the EMP's mouth into the mouth of  
21   the victim. This is continued until more sophisticated help and  
22   equipment arrives.

23          There are several conventional machines that mechanically  
24   re-create the sequence described above. The major advantages of

1 the machines is a regularity of the simulated heartbeat and a  
2 larger volume of uncontaminated oxygen rich air synchronized with  
3 each other. One such machine is portable and has a small  
4 compressed air tank which powers a small piston, strapped to the  
5 victims chest, and a breathing mask placed over the victim's  
6 mouth. Once the device is in place the EMP must monitor the  
7 operation until it is completed.

8 There are other methods of increasing the cardiac support  
9 and volume of air inhaled by a weakened victim. One of these  
10 devices is taught by U. S. Patent No. 6,155,976 which discloses  
11 an oscillation table for carrying a supine victim and moves  
12 horizontally along the long axis through displacement modules  
13 controlled by computer. The device has several monitors and may  
14 be used as a trigger for other CPR support.

15 What is needed in the art is device to simultaneously apply  
16 oscillation to the victim along with CPR procedures to improve  
17 the outcome of the CPR over that produced by manual or mechanical  
18 or oscillation CPR, alone.

## 19 20 Objects of the Invention

21 Accordingly, it is an object of this invention to provide an  
22 oscillation table with integrated facilities for external heart  
23 massage and ventilation.

24 It is another object of the invention to provide for manual

1 CPR procedure during oscillation of the victim.

2 It is still another object of the invention to provide for  
3 mechanical CPR during oscillation of the victim.

4 It is yet another object of the invention to provide  
5 coordination and synchronization between the oscillations of the  
6 table and the CPR manipulations.

7 Other objects and modifications will become apparent from  
8 the description of the invention.

9  
10 Brief Description of the Drawings

11 Fig. 1 is a perspective of the oscillation table and CPR  
12 device;

13 Fig. 2 is a top plan view of the oscillation table showing  
14 one embodiment of the motive force for oscillation;

15 Fig. 3 is a top plan view of another embodiment of the  
16 motive force for oscillation; and

17 Fig. 4 is a side view of the oscillation table and CPR  
18 device, partially in schematic.

19  
20 Detailed Description of the Drawings

21 In Fig. 1, the oscillation table 10 is shown mounted on a  
22 pedestal 11 having pistons having a platform 12 which oscillates  
23 to move in the lengthwise direction to and fro. When the victim  
24 is lying supine on the platform 12, the direction of movement is

1 in the cephalo-caudal direction or parallel to the spine. The  
2 platform 12 supports the spine of the victim so that the chest  
3 cavity may be depressed during CPR. The platform 12 is mounted  
4 on a framework 13, in the form of rails 14, movably supported by  
5 the pedestal 11. The oscillation source 15 is placed between  
6 the rails 14 and connected to them for the reciprocating  
7 movement, as well as, the motive force for the table 10. In Fig.  
8 2, the framework is connected to one end of opposing piston rods  
9 16 and 17. The other ends of the opposing piston rods are  
10 attached to a double acting piston 18 housed within cylinder 19  
11 fixedly mounted in the pedestal 11.

12 In Fig. 3, another embodiment of the oscillation source 15  
13 is shown as an electric motor 20 connected, directly or through  
14 gears, to a flywheel 21. The flywheel 21 has a rod 22 with one  
15 end eccentrically connected by wrist pin 23 and the other end  
16 connected to the framework 13.

17 Figs. 2 and 3 are examples of mechanisms for creating  
18 oscillation in the table 10. Other designs, such as opposing  
19 pistons at each end of the table, are included as matters of  
20 choice. The operation of the piston rods may be by a electrical,  
21 mechanical, pneumatic, or hydraulic source of power.

22 The platform 12 may be mounted on legs attached to each  
23 corner with casters movably supporting the platform on the floor  
24 for oscillatory movement (not shown). In this modification, the

1 table 10 includes a headboard and a footboard carrying pistons.

2 The table 10 may have the capability of vibratory movement  
3 (not shown) in the anterior-posterior direction as a component of  
4 the oscillatory movement of the victim. The movement of the  
5 table 10 appears to create a massage of the internal organs,  
6 including the heart and lungs, within the musculo-skeletal body  
7 by the abrupt change in direction of movement of the victim's  
8 body. In addition, there may be certain physical reflex actions  
9 stimulated by the movement that contribute to the victim's  
10 resuscitation. The oscillations of the platform may be repeated  
11 to approximate the normal breathing cycle of inhalation and  
12 exhalation or the oscillations may be manually controlled.

13 Platform 12 includes a mounting 24 for connecting a  
14 mechanical CPR device 25. The mounting 24 may form a permanent  
15 connection between the platform and the vertical support 26 or it  
16 may be a removable connection. The vertical support 26 has a  
17 horizontal arm 27 which is parallel with the surface of the  
18 platform 12. The horizontal arm 27 may be rotated about the  
19 support 26 to be placed above the sternum of a supine victim.  
20 The horizontal arm 27 terminates with a cylinder 28. Within  
21 cylinder 28 is a reciprocating piston carrying a pad 29 which  
22 contacts the victim and depresses the chest cavity as the piston  
23 repeatedly moves in the anterior-posterior direction. The piston  
24 may repeat each stroke in a sequence that approximates a normal

1 heartbeat or it may be manually controlled. Piston may have the  
2 same source of power as the oscillation source 15 or it may be  
3 independently powered. Further, the piston may be located in the  
4 vertical support 26 with the cylinder 28 being solid.

5 The pad 29 may be of such a size and material to prevent  
6 trauma to the sternum and ribs of the victim.

7 A controller 30 is connected to the table 10, oscillation  
8 source 15 and the CPR device 25 to regulate, coordinate and  
9 synchronize the oscillations of the table and the strokes of the  
10 CPR device to maximize the efficiency and effectiveness of the  
11 combined procedures in resuscitation of the victim. As mentioned  
12 above, the controller 30 may have a manual mode for independent  
13 control of each component. The controller may be mechanical,  
14 electrical or electronic. In another embodiment, the controller  
15 may be omitted.

16 In the event that manual CPR is continued after the victim  
17 is placed on the table 10, the platform 13 may accommodate the  
18 person giving the manual CPR. The person may occupy the space of  
19 the mounting 24. In another embodiment (not shown), the person  
20 may be supported on a small movable stage connected to the  
21 platform and depending from the rails. Alternately, the person  
22 could remain stationary and give a depressing stroke when the  
23 victim's sternum is located under his hands.

24 The table 10 may also be equipped with a ventilating device

31, in the form of a face mask or tracheal tube for forcing  
oxygen or compressed air into the lungs of the victim. The  
cylinders of gas may be stored in the pedestal 11. The  
ventilating device 31 may be operated through the controller 30  
to synchronize the inhalation with the oscillations and CPR  
strokes.